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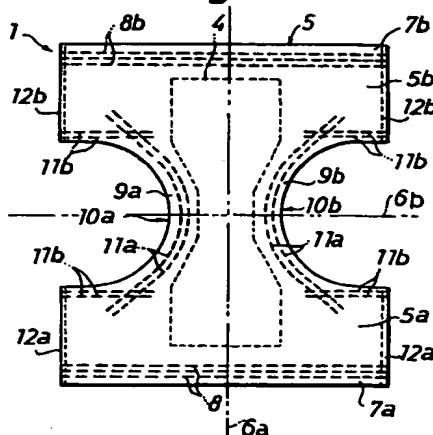
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54 Disposable diaper.

57 In a disposable diaper including a body having a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent member interposed therebetween, the body being divided into a stomach portion which, when in wear, is located on a wearer's stomach side and a back portion which, when in wear, is located on his back side, the stomach portion and the back portion being connected and fixed together at both side edge portions, respectively, of the stomach and back portions to form a pair of leg opening portions and a unitary waist opening portion,

the waist opening portion and pair of leg opening portions are provided around entire peripheral edges thereof with elastic members forming substantially continuous gathers.

Fig. 1



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BACKGROUND OF THE INVENTION

[Field of the Invention]

5 This invention relates to a disposable diaper for infants, adults or incontinent persons, and particularly to a shorts type disposable diaper.

[Description of the Prior Art]

10 In general, this kind of disposable diapers include a vertically long body comprising a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent member interposed therebetween, the body being divided into a stomach portion which, when in wear, is located on the stomach side of its user and a back portion which, when in wear, is located on his back side.

15 As a known disposable diaper of this type, there is, for example, a flat type in which both side edges (side flaps) of the back portion are provided with fastening devices which, when in use, are fastened to the stomach portion of the body (Japanese Patent Publication No. Sho 52-40267).

20 In a recent time, there was proposed a shorts type disposable diaper in which a pair of right and left side flaps formed along both longitudinal sides of its body are connected and fixed together at both stomach and back portions to form a pair of right and left leg opening portions and a unitary waist opening portion (Japanese Patent Early Laid-open Publication No. Sho 61-207605). In the shorts type disposable diaper, both the pair of leg opening portions and the unitary waist opening portion are designed to be expansible so as to fit to the wearer's body. Usually, since the wearer himself can wear this shorts type disposable diaper in his standing state, it is used as a toilet training underwear for a baby to prompt him to be free from a diaper as soon as possible. It is also used for an incontinent person, or an adult who can walk.

25 The shorts type disposable diaper of this type has such feature, when compared with the so-called flat type diaper, as that the wearer can pull it up and down by himself just like a normal underwear. In order to satisfy the requirement that the wearer himself can easily wear it without leakage of waste materials, the shorts type disposable diaper is required to have an excellent fitness. Moreover, it is required to have a favorable compliance to the wearer's busy action.

30 In order to meet with such requirements as mentioned above, Japanese Patent Early Laid-open Publication No. Hei 2-4364 discloses a constitution, wherein an expansible side panel (side member) is provided to side portions for connecting a stomach portion with a back portion of a body, and elastic members are provided to an end portion of the stomach side and an end portion of the back side of the body.

35 That is, as is shown in Fig. 8, in a body 55 of a conventional diaper 51, an under-crotch portion is provided at both side edges thereof with side flaps 59a, 59b extending outward of an absorbent member 54, and the body 55 is provided at both end portions thereof with waist flaps 57a, 57b extending outward of the absorbent member 54, the side flaps 59a, 59b of the under-crotch portion being provided with elastic members 61, 61 which are arranged thereon in expansible states. Similarly, the waist flaps 57a, 57b are provided with elastic members 58a, 58b which are arranged thereon in expansible states in order to enhance the fitness around the wearer's waist part. The body 55 is provided on both sides of its back portion with side panels 62, 62 and on both sides of its stomach portion with side panels 63, 63. Each of the side panels 62 and 63 is formed of an elastic member which is a separate member from the body 55, and the side panels 62 and 63 are connectable with each other at end portions 64, 64 thereof.

40 However, owing to the correlation of expanding lines of stress (indicated by two-headed arrows with empty inside in Fig. 7) at the leg opening portions and at the waist opening portion, which respectively are formed by the elastic members 61, 58a, 58b and the side panels 62, 63 having elasticity, as shown in its worn state in Fig. 9, the conventional shorts type disposable diaper 51 has the following problems.

50 The expression "expanding lines of stress" refers to expansible portions applied with gatherings formed of an elastic member.

That is, although the expanding lines of stress of the respective opening portions are intersected with each other when they are extended, a gap portion X is sometimes formed between adjacent expanding lines of stress, the gap portion X where no expanding line of stress exists. For example, when the wearer is in a bending attitude, gaps X are formed between the diaper and the wearer at his stomach portion, and these gaps X are turned out to be a cause of leakage.

Further, it has such problems as that since the side panels 62, 63 are formed of a separate member from the body, the number of component parts of the diaper is increased and the manufacturing process

becomes complicated, thus resulting in high cost.

Furthermore, the side panels 62, 63 are of a unitary member, and the physical property of each portion is the same. Accordingly, in order to increase the fastening force for preventing a slip-down and enhancing the fitness, the expansion of the whole side panels 62, 63 is required to be increased. However, if the expansion is increased, an excessive oppressive sensation is given to the wearer or the increased expansion jeopardizes the wearer's smooth putting-on and putting-off performance.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a disposable diaper capable of surely preventing the leakage of waste material and reducing the costs.

The present invention has achieved the above object by providing a disposable diaper including a body having a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent member interposed therebetween, said body being divided into a stomach portion which, when in wear, is located on a wearer's stomach side and a back portion which, when in wear, is located on his back side, the stomach portion and the back portion being connected and fixed together at both side edge portions, respectively, of said stomach and back portions to form a pair of leg opening portions and a unitary waist opening portion, wherein the waist opening portion and pair of leg opening portions are provided around entire peripheral edges (which are also referred to as surrounding portions) thereof with elastic members forming substantially continuous gathers.

Furthermore, the present invention has achieved the above object by providing a disposable diaper including a body having a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent member interposed therebetween, connecting and fixing a stomach portion located on a wearer's stomach side and a back portion located on his back side together at both side edge portions, respectively, of the stomach and back portions to form a unitary waist opening portion, a pair of leg opening portions and a waist portion, and forming gathers around surrounding portions of the waist opening portion and the leg opening portions and at least part in the surrounding direction of the waist portion, wherein expanding stresses in the surrounding direction of the surrounding portions of the waist opening portion, the leg opening portions and the waist portion are different.

When the disposable diaper of the present invention is in wear, the substantially continuous gathers, which are integrally formed with the body, continuously act on both the waist opening and the pair of leg opening portions. As a result, no gap is formed between the diaper and its wearer and it can surely prevent the leakage of waste material from the diaper.

The term "continuously" refers to a state where expanding lines of stress are continuous without interruption. It suffices, if, for example, the gathers are substantially continuous through the connected portion and they are not necessarily be continuous as the elastic members.

Further, since the continuous gathers are integrally formed with the body of the diaper, the component parts can be reduced when compared with the prior art where the body is formed of a separate member, the manufacturing process can be simplified, and the manufacturing cost can be reduced.

Furthermore, the gathers of the present invention can be improved in fitness and handling by arranging a plurality of elastic members in juxtaposed relation or superposed relation.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a view showing a developed state of a disposable diaper according to one embodiment of the present invention.

Fig. 2 is a perspective view of the disposable diaper of Fig. 1, showing a state when it is put on a wearer.

Fig. 3 is a view showing a developed state of a disposable diaper according to another embodiment of the present invention.

Fig. 4 is a perspective view of the disposable diaper of Fig. 3, showing a state when it is supposed to be worn by a wearer.

Fig. 5 is a perspective view of a disposable diaper according to still another embodiment of the present invention, showing a state when it is supposed to be worn by a wearer.

Fig. 6 is a perspective view of a disposable diaper according to still another embodiment of the present invention, showing a state when it is supposed to be worn by a wearer.

Fig. 7 is an explanatory view showing wearer's portions corresponding to the disposable diaper when the diaper of Fig. 6 is supposed to be worn by him.

Fig. 8 is a view showing a developed state of the conventional disposable diaper.

Fig. 9 is a perspective view of the conventional disposable diaper, showing a state when it is put on a wearer.

5 DETAILED DESCRIPTION OF THE EMBODIMENT

Several embodiments of the present invention will be described in detail with reference to Figs. 1 through 5 of the accompanying drawings.

A disposable diaper 1 of the present invention includes a body which comprises a liquid impermeable topsheet 2, a liquid impermeable backsheet 3 corresponding to the topsheet 2, and an absorbent member 4 fixedly interposed between both the topsheet and backsheet 2 and 3 and adapted to absorb waste material.

The body 5 is divided into a stomach portion 5a which, when in wear, is located on the wearer's stomach side and a back portion 5b which, when in wear, is located on his back side, the stomach portion 5a and back portion 5b being symmetric with reference to a vertical center line 6a which is located generally at its center.

In the stomach portion 5a and back portion 5b of the body 5, the absorbent member 4 is provided on both longitudinal edges thereof with a pair of waist flaps 7a, 7b extending outward therefrom, elastic members 8a, 8b for forming a gather on each waist flap 7a, 7b, a pair of right and left side flaps 9a, 9b extending outward from both side edges of the absorbent member 4 in the width direction thereof, and elastic members 11a, 11b for forming a gather on each leg portion 10a, 10b of each side flap 9a, 9b, the side flaps 5b, 5a on both the back and stomach sides being partially connected and affixed at both the side edges 12b, 12a to form the waist opening portion 13 and a pair of right and left leg opening portions 14a, 14b (see Fig. 2).

The waist flaps 7a, 7b and the side flaps 9a, 9b are the overlapped portions of the topsheet and backsheet 2 and 3 and are integral with the body 5.

The elastic members 8a, 8b of the waist flaps 7a, 7b are continuously connected with the topsheet 2 and backsheet 3 as a plurality of yarn-like members arranged in generally parallel relation along the edges of the waist flaps 7a, 7b. When the waist opening portion 13 is formed by this, the elastic members 8a, 8b of the waist flaps 7a, 7b are continuously arranged along the peripheral edge of the waist opening portion 13.

On the other hand, the elastic member 11a is arcuate and the member 11b is linear. The arcuate elastic member 11a is formed in an arcuate configuration along a horseshoe shape of each leg portion 10a, 10b at the side flaps 9a, 9b. Further, the linear elastic member 11b linearly extends to a concave portion of the horseshoe shape in each side flap from each side flap 9a, 9b and intersected with the arcuate elastic member 11a. The elastic members 11a, 11b of this side flap are arranged adjacent to the edges of the pair of leg portions, that is, adjacent to the side edges of the side flaps 9a, 9b in the under-crotch area, the distance from the side edges to the outermost edges of the elastic members 11a, 11b of the side flap is preferably 0~50mm and more preferably 0~20mm and the distance from the outer edge of the absorbent member to the innermost edges of the elastic members 11a, 11b is preferably 0~50mm and more preferably 0~20mm.

The elastic members 11a, 11b of the side flap are connected to the body 5 of the shorts type disposable diaper 1 in generally stretched states by means known per se, such as ultrasonic welding, heat welding, adhesive agent, etc. Any material known in the art, such as yarn rubber, flat rubber, film type rubber or tape-like foam polyurethane can be used, and a unitary piece or a plurality of pieces may be used. In general, however, the elastic members 11a, 11b of the right and left side flaps are arranged in symmetric relation. The stress is preferably 70~100g when they are stretched 150%. In order not to generate a gap at the opening portion, the stress of the elastic member 11a, 11b may be arranged to be different from each other or otherwise it may be formed such that the stresses of the outer elastic members of the respective 11a, 11b become high.

The elastic members 8a, 8b of the waist flap are preferably of non-woven fabric type having expansibility, the expansibility being preferably larger in the width direction rather than in the longitudinal direction. The elastic members 8a, 8b of the waist flap are connected and fixed to the waist flaps 7a, 7b by known means in the art such as adhesive agent such as hot melt, ultrasonic welding, heat welding, etc. Further, the elastic members 8a, 8b of this waist flap are connected in such states as being expandable.

The term "connected" used herein refers to a state where both the elastic members are contacted with each other in such a manner as to be able to generate at least an expanding line of stress as in the above term "continuously", and preferably connected in such a manner as to be, either directly or indirectly, superposed one upon the other.

The topsheet 2 is a liquid permeable sheet for permeating waste material to the absorbent member 4 and preferably has a feel something like an undergarment. Examples of such liquid permeable sheet are preferably woven fabrics, nonwoven fabrics, perforated films and the like. The permeation leakage of waste materials such as urine and the like from the edge portion of the topsheet 2 can be prevented by applying a water repellent treatment to the peripheral edge portion of the top sheet by a method for applying a hydrophobic compound such as silicon series oil solution, paraffin wax and the like to the peripheral edge portion of the topsheet 2 or by a method for applying a hydrophilic compound such as alkyl phosphoric ester to the peripheral edge portion of the topsheet 2 in advance and then cleaning the peripheral edge with hot water.

The backsheets 3 are preferably a moisture permeable and liquid impermeable sheet able to permeate vapor therethrough and formed of a thermoplastic resin and filler added thereto and stretched and more preferably a sheet having a feel something like an undergarment. Examples of such liquid impermeable sheet are a composite material of film and a woven fabric or a composite material of film and a woven fabric.

The absorbent member 4 used in the disposable diaper 1 of this embodiment is preferably comprised of a fluff pulp as a chief component material and a high molecular water absorbent polymer as a secondary material, or a mixture of a thermoplastic resin, a cellulosic fiber and a high molecular water absorbent polymer subjected to heat treatment. The existing position of the high molecular water absorbent polymer may be in an upper layer, an intermediate layer or a lower layer, and the high molecular water absorbent polymer may be mixed with pulp. The high molecular water absorbent polymer preferably has an ability for absorbing and holding liquid more than twenty times the dead weight thereof and is in a grain shape having a property able to be gelled. Examples of such high molecular water absorbent polymer are preferably starch-acrylic (salt) graft copolymer, a saponified material of starch-acrylonitrile copolymer, bridged material of sodium carboxymethylcellulose, acrylic (salt) polymer and the like.

The shorts type disposable diaper 1 of this embodiment can be obtained by folding the body of the diaper 1 back into a half along the horizontal center line 6b and connecting and fixing both side edges 12a, 12a of the back portion 5b to both side edges 12b, 12b of the stomach portion 5a. At this time, the elastic member 11b of the side flap located on the stomach portion 5a is superposed on the elastic member 11b of the side flap located on the stomach portion 5a, while the elastic member 8b of the waist flap 7b on the back side is superposed on the elastic member 8a of the waist flap 7a on the stomach side.

When the shorts type disposable diaper of this embodiment is in wear, as is shown in Fig. 2, a continuous gathering is formed at the pair of opening portions 14a, 14b by the elastic members 11a, 11b of the side flap, and a continuous gathering is formed at the waist opening portion 13 by the elastic members 8a, 8b of the back and waist flaps.

Accordingly, in the shorts type disposable diaper of this embodiment, the gather integrally and continuously formed on the body continuously acts on the waist opening portion 13 and the leg opening portions 14a, 14b to enhance the fitness to the wearer and also to surely prevent the leakage of waste material from the diaper.

Further, since the elastic members 8a, 8b of the waist flap and the elastic members 11a, 11b of the side flap are simply contacted with the body 5, the component parts can be reduced and the manufacturing process can be simplified.

Furthermore, by juxtaposing a plurality of elastic members 8a, 8a and 11a, 11b or intersecting them with each other, an expanding stress fitted to the wearer's body shape can be exhibited, thus enabling to enhance the fitness and prevent leakage.

Next, other embodiments of the present invention will be described with reference to Figs. 3, 4 and 5.

In a disposable diaper 15 according to another embodiment shown in Figs. 3 and 4, in addition to the elastic members 8a, 8b of the waist flap, a plurality of body-surrounding elastic members 16a, 16b are arranged continuously in belt shape in the surrounding portion of a waist portion located between the waist opening portion and the leg opening portions (the area where the absorbent member 4 is disposed.)

A disposable diaper 18 shown in Fig. 5 is different from the disposable diaper shown in Figs. 3 and 4 in that body-surrounding elastic members 16a, 16b are arranged at only both side portions of the waist portion and not at the area where the absorbent member 4 of the embodiment shown in Figs. 3 and 4 is disposed.

The elastic members 8a, 8b of the waist flap, the elastic members 11a, 11b of the side flap, and the body-surrounding elastic members 16a, 16b are preferably formed of natural rubbers, polyurethane, foam polyurethane, etc. and may be of yarn or belt form.

Since the disposable diaper 18 of this embodiment has the above-mentioned constitution, it does not slip out of place downward irrespective of any movements of the baby (wearer). In addition, since no gap is generated at the wearer's side, leakage of waste material can surely be prevented.

Still another embodiment of the present invention will be described with reference to Figs. 6 and 7.

The embodiment shown in Fig. 6 is constituted substantially the same as the embodiment shown in Figs. 3 and 4 except the following differences.

In the embodiment shown in Fig. 6, body-surrounding elastic members 16 are arranged at both side portions of the waist portion and at a part of the area where the absorbent member 4 is disposed.

In this embodiment an elastic member 8 of a surrounding portion A of the waist opening portion is arranged around the surrounding portion A of the waist opening portion thereby forming a waist gather. The elastic members 11a, 11a of a surrounding portion C of the leg opening portions are arranged around the surrounding portion C of the leg opening portions thereby forming a leg gather.

The elastic members 16, 16 of a surrounding portion B of the waist portion are arranged at both side portions of the waist portion and at a part of the area where the absorbent member 4 is disposed, as shown in Fig. 6, and a gather is formed in the surrounding portion B on which the elastic members 16, 16 are disposed, so that the surrounding portion B can fit the wearer's waist.

Referring to the elastic member 8 of the surrounding portion A, the elastic members 11a, 11a of the surrounding portion C and the elastic members 16, 16 of the surrounding portion B, it is preferable that those elastic members show the expanding stresses (per 5mm in width and 10mm in length in the expanding direction) of 10 to 120g, 20 to 150g and 30 to 300g, in a 20% stretched state, in a 50% stretched state and in a 100% stretched state, respectively. The elastic members showing about 60g, 140g and 220g, in a 20%, 50% and 100% stretched states, respectively, are used in this embodiment.

Furthermore, the surrounding portion A of the waist opening portion, the surrounding portion B of the waist portion and the surrounding portion C of the leg opening portions are, as shown in Fig. 7, disposed corresponding to a waist area a, a hipbone area b and a groin area c of a baby (wearer).

Since the surrounding length of the surrounding portion C of the leg opening portions passes over the groin of a wearer, it is largely affected by his activities and the postures. Generally a baby has a figure that the hipbone area b is narrower than the waist area a and the groin area c to form a shape like a constricted barrel (like a sand glass shape). Therefore, the ordinary surrounding length of a diaper when it is worn is shown as surrounding portion A of the waist opening portion > the surrounding portion C of the leg opening portions > surrounding portion B of the waist portion. The maximum variation value (ΔA , ΔB , ΔC) due to wearer's postures and activities is shown as $\Delta A > \Delta C > \Delta B$. The stress put on the each portion of the diaper is in relation of surrounding portion A of the waist opening portion > surrounding portion C of the leg opening portions > surrounding portion B of the waist portion.

The surrounding length of the portions A, B and C of the diaper of the present invention varies. If the maximum value of the stresses (per 5mm in width and 10mm in length) in a 20% stretched state of the surrounding portions of said waist opening portion, said waist portion and said leg opening portions is 10 to 120g, preferably 10 to 60g, the maximum value of the stresses (per 5mm in width and 10mm in length) in a 50% stretched state thereof is 20 to 150g, preferably 20 to 100g and the maximum value of the stresses (per 5mm in width and 10mm in length) in a 100% stretched state thereof is 30 to 200g, preferably 30 to 150g, a wearer does not feel oppressive sensation, and he can put it on easily. Furthermore, no gap is generated in the surrounding portion A of the waist opening portion and in the surrounding portion C of the leg opening portion, so that an excellent effect to prevent slipping out of place downward and to prevent leaking can be obtained.

The above-mentioned explanation with reference to Figs. 6 and 7 is also applied to the embodiments shown in Figs. 3, 4 and 5.

(TEST EXAMPLE)

The following leak and slip tests were made using disposable diapers (dispers according to other embodiments) listed below.

TEST EXAMPLE 1

In this test, the disposable diaper shown in Figs. 3 and 4 was prepared using the under-mentioned material and arranging four waist-surrounding elastic members 16a, 16b, which were in 180% expanded states, in the topsheet and backsheet.

Then, the following test was made using this disposable diaper 15. The results are shown in Table listed below.

• TOPSHEET 2

Non-woven fabric formed of polypropylene (35g/cm²)

- BACKSHEET 3
Polyethylene film (thickness: 40 μ)
- ABSORBENT 4
Composite material of fluff pulp and high absorbent polymer (bridged material of polyacrylic Na)
- 5 • Elastic members 8a, 8b of waist flap
Waist flap film width: 10mm
- Elastic members 11a, 11b of side flap
Elastic rubber of 2mm width: 4 pcs.
- 10 • Waist-surrounding elastic member 16
Urethane yarn rubber

(LEAK TEST AND SLIP TEST)

In this test, the above-mentioned disposable diaper 15 was put on a baby model of a weight of 10kg. After the baby model has changed its attitude between a standing state and a sitting state 20 times, the slipping amount of the diaper was measured. Then, the model was laid horizontally or facing downward, an artificial urine (physiological saline solution) was supplied from a tube attached to the model so that the discharging speed of urine from its urine discharging portion will be 5g/sec. The artificial urine was supplied until leak occurs, and the effect of leak was observed. Further, an artificial soft feces mentioned below was supplied from the tube so that the feces discharging speed from its discharging portion will be 4g/sec. The effect of prevention of feces leak was likewise observed in the model's horizontal lying state.

- ARTIFICIAL SOFT FECES: Suspension of bentonite of 3wt.% was adjusted to have a viscosity of 10c.p. by carboxyethyl cellulose

25 TEST EXAMPLE 2

The disposable diaper 18 shown in Fig. 5 was prepared by providing four pieces of elastic material, which was in a 180% stretched state, between a topsheet and a backsheet around a part of a wearer's waist. Then, the above-mentioned test was made using this disposable diaper. the results are shown in Table listed below.

COMPARATIVE TEST EXAMPLE 1

In this test, a comparative item, in which the waist-surrounding elastic members 16a, 17a are not used, was prepared, and the same test as the test examples 1 and 2 was made. The results are shown in the Table listed below.

(EVALUATION OF TEST)

According to the results of the tests shown in the following Table 1, the diapers of the present invention were small in slipping length, large in absorbing amount of artificial urine and artificial feces and excellent in antileak compared with the comparative item.

Table

5		Slipping	Absorption	Absorption	Absorption
		length	until urine	until urine	until feces
10		(mm)	leak in hori-	leak in face-	leak in hori-
			zontal state	down state	zontal state
			(g)	(g)	(g)
15					
	Test 1	5	200	280	100
20	item 2	10	180	250	90
	Compara-				
25	tive item	40	70	120	40

That is, the disposable diaper 15 according to another embodiment of the present invention exhibits such effects as that the waist-surrounding part of the diaper 15 fits to the baby's body and leak of waste material from a gap of the gather can surely be prevented, in addition to the above-mentioned effects.

It should be understood that the present invention is not limited to the above-mentioned embodiment and can be changed and modified within the spirit and scope of the present invention.

For example, the elastic members of the side flap are not limited to such constitution as that the elastic member 11a arranged in arcuate shape and the expansible member 11b arranged in linear shape are intersected with each other. Alternatively, they may be arranged in a curve shape.

Furthermore, the elastic member 11b of the side flap is not limited to its linear arrangement but it may be arranged in a curve shape.

40 Claims

1. A disposable diaper including a body having a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent member interposed therebetween, said body being divided into a stomach portion which, when in wear, is located on a wearer's stomach side and a back portion which, when in wear, is located on his back side, said stomach portion and said back portion being connected and fixed together at both side edge portions, respectively, of said stomach and back portions to form a pair of leg opening portions and a unitary waist opening portion, wherein;
said waist opening portion and pair of leg opening portions are provided around entire peripheral edges thereof with elastic members forming substantially continuous gathers.
2. A disposable diaper as claimed in claim 1, wherein said body further includes an elastic member for substantially continuously forming a gather in a surrounding portion of a waist portion located between said waist opening portion and said leg opening portions.
3. A disposable diaper as claimed in claim 1, wherein said body further includes an elastic member for forming a gather on both side portions of a waist portion located between said waist opening portion and said leg opening portions.

4. A disposable diaper as claimed in one of claims 1 through 3, wherein said gather is formed by a plurality of elastic members arranged in juxtaposed relation at spaces.
5. A disposable diaper as claimed in one of claims 1 through 4, wherein each of said leg opening portion forms a substantially continuous gather by partly superposing a plurality of elastic members.
6. A disposable diaper including a body having a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent member interposed therebetween, connecting and fixing a stomach portion located on a wearer's stomach side and a back portion located on his back side together at both side edge portions, respectively, of said stomach and back portions to form a unitary waist opening portion, a pair of leg opening portions and a waist portion, and forming gathers around surrounding portions of said waist opening portion and said leg opening portions and at least part in the surrounding direction of said waist portion, wherein;
 - expanding stresses in the surrounding direction of the surrounding portions of said waist opening portion, said leg opening portions and said waist portion are different.
7. A disposable diaper as claimed in claim 6, wherein the stresses in a 50% stretched state of the surrounding portion of said waist opening portion, the surrounding portion of said leg opening portions and the surrounding portion of said waist portion are in relation that the stress of the surrounding portion of said waist opening portion is the biggest of all, and the stress of the surrounding portion of said leg opening portions is bigger than that of the surrounding portion of said waist portion.
8. A disposable diaper as claimed in claim 6 or claim 7, wherein the maximum value of the stresses (per 5mm in width and 10mm in length) in a 20% stretched state of the surrounding portions of said waist opening portion, said waist portion and said leg opening portions is 10 to 120g, the maximum value of the stresses (per 5mm in width and 10mm in length) in a 50% stretched state thereof is 20 to 150g, and the maximum value of the stresses (per 5mm in width and 10mm in length) in a 100% stretched state thereof is 30 to 200g.
9. A disposable diaper as claimed in one of claims 6 through 8, wherein the stresses in a 50% stretched state of said stomach portion and said back portion in the surrounding portion of said waist opening portion are different.

Fig .1

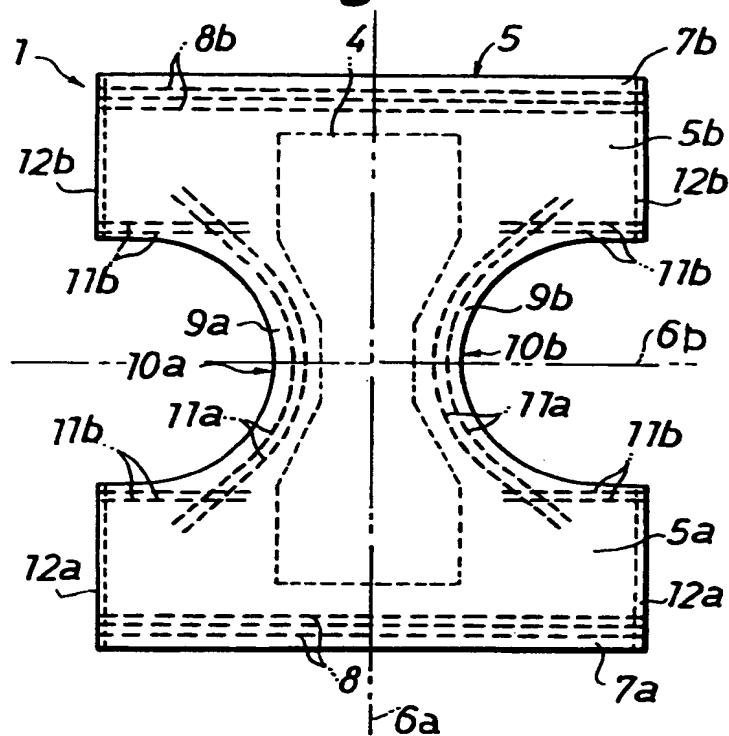


Fig .2

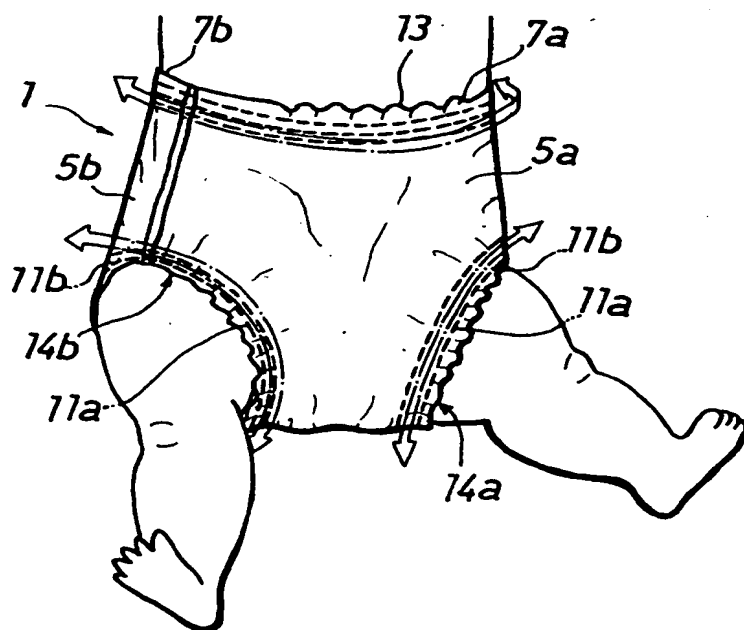


Fig .3

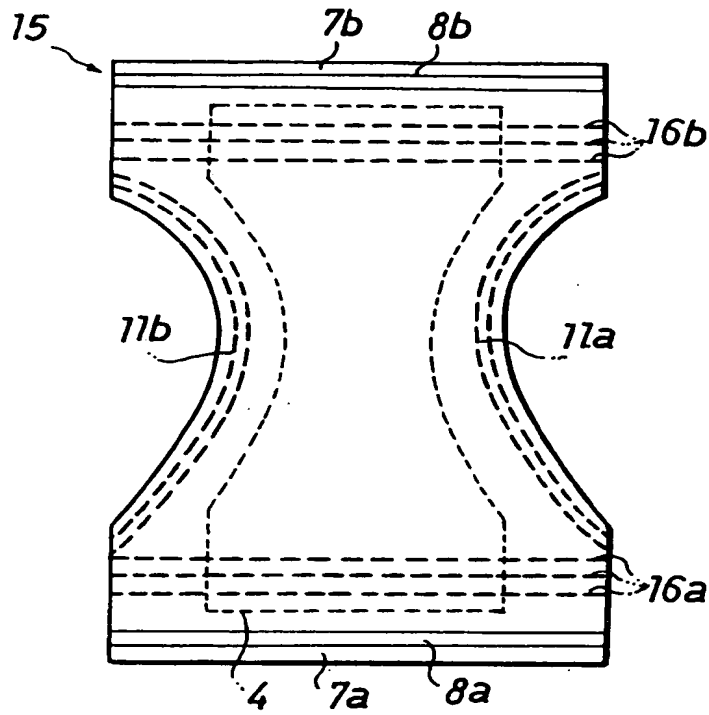


Fig .4

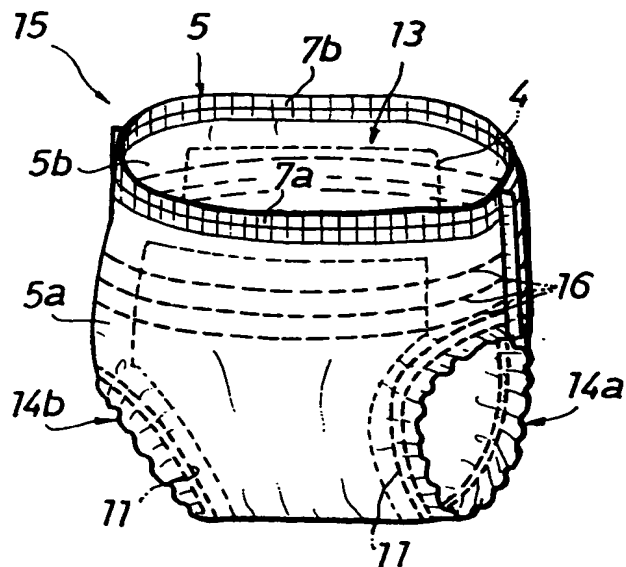


Fig .5

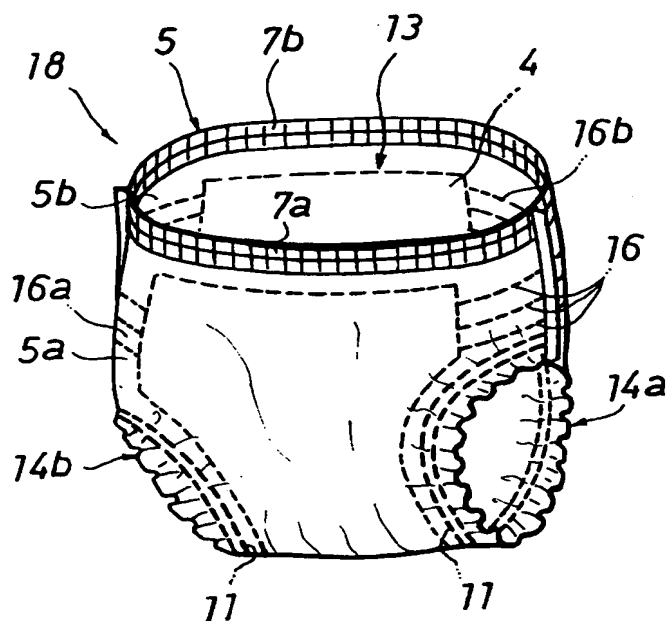


Fig .6

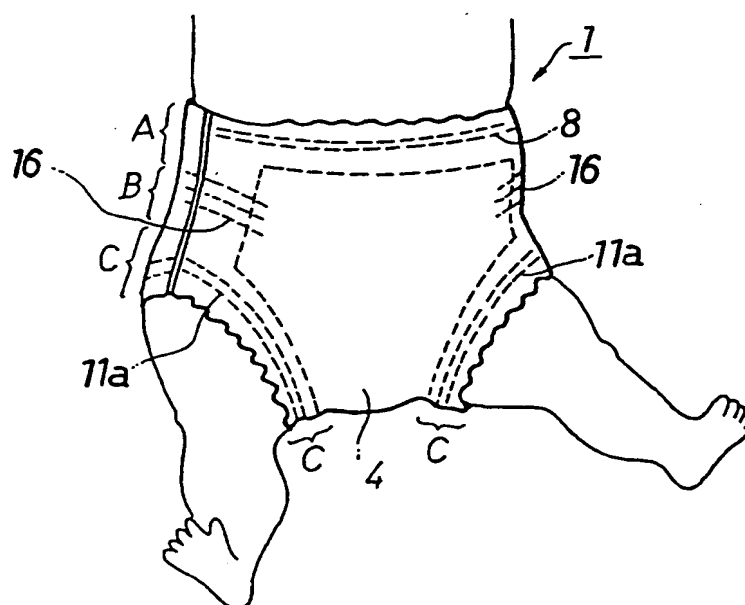


Fig .7

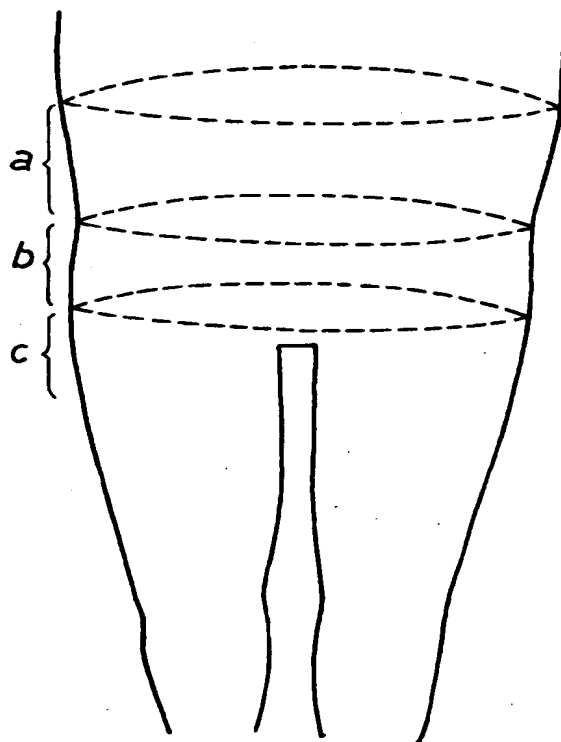


Fig .8

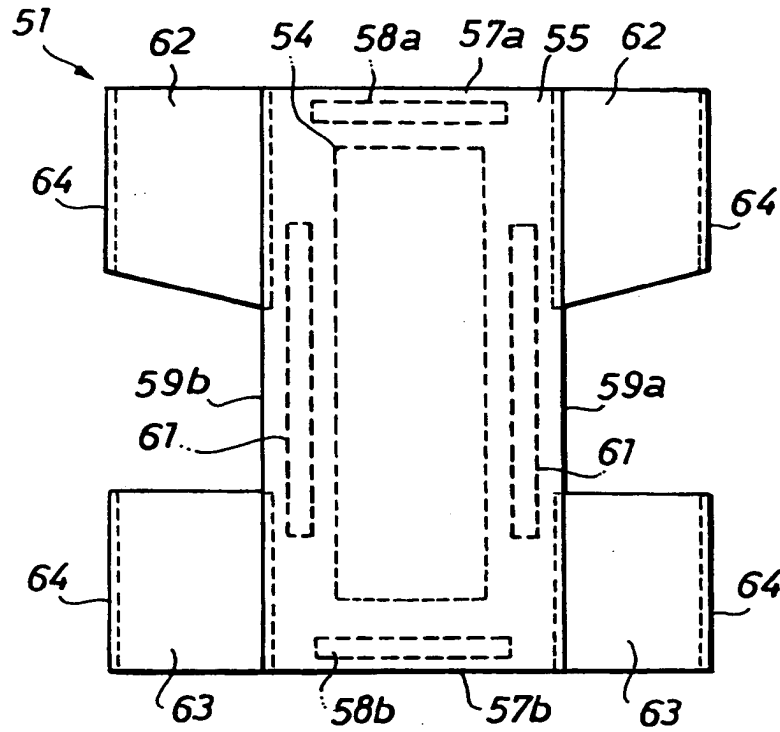
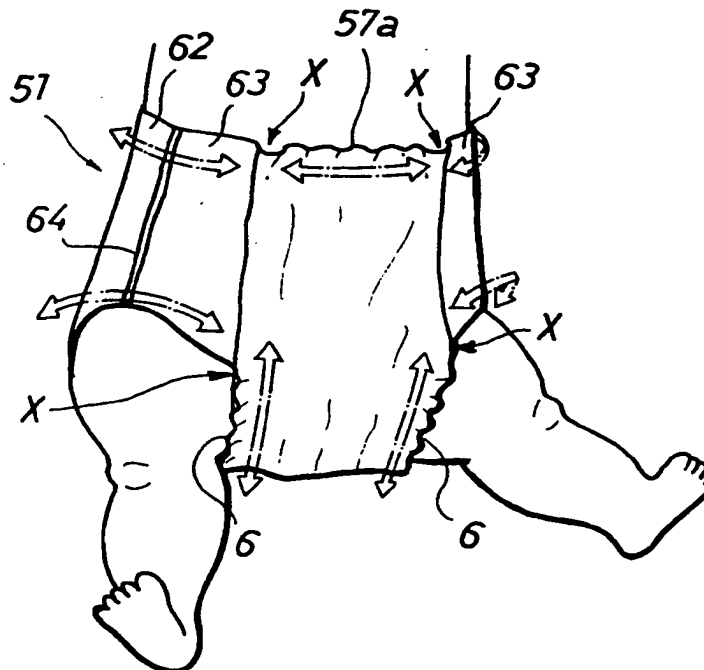


Fig .9



(19)



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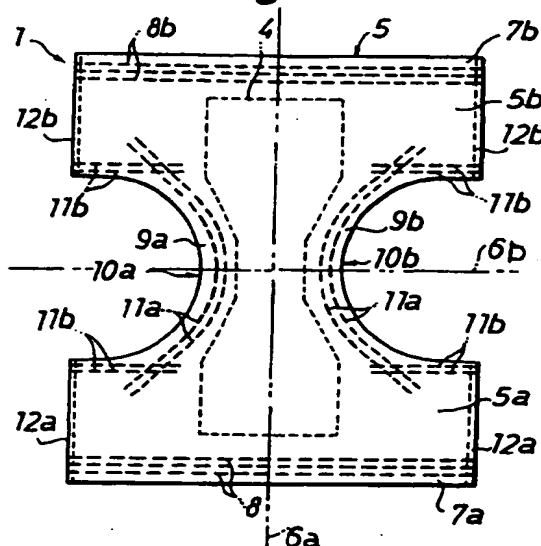
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(54) Disposable diaper.

(57) In a disposable diaper (1) including a body having a liquid permeable topsheet, a liquid impermeable backsheet, and an absorbent member (4) interposed therebetween, the body (5) being divided into a stomach portion (5a) which, when in wear, is located on a wearer's stomach side and a back portion (5b) which, when in wear, is located on his back side, the stomach portion and the back portion being connected and fixed together at both side edge portions (12a,12b), respectively, of the stomach and back portions to form a pair of leg opening portions (10a,10b) and a unitary waist opening portion,

the waist opening portion and pair of leg opening portions are provided around entire peripheral edges thereof with elastic members (8a,8b,11a,11b) forming substantially continuous gathers.

Fig .1



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European Patent
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EUROPEAN SEARCH REPORT

Application Number

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X A	EP-A-0 187 727 (KIMBERLY CLARK CORP.) * abstract; claims 1,6-8; figures 1,2; example * ----	1 4,6	A61F13/15
X	EP-A-0 048 011 (BOUSSAC SAINT FRERES B.S.F.) * claims 1,2; figures 1-3 * ----	1	
X A	US-A-4 205 679 (REPKE ET AL.) * column 6, line 17 - column 7, line 31; claims 4,7,8; figures 1,5-7,18-21 * ----	1 6	
X A	EP-A-0 241 925 (UNI-CHARM CORP.) * claims 1,2; figures 1,2 * ----	1 4,5	
A	US-A-4 938 754 (MESEK) * column 1, line 55 - column 2, line 13; figures 1,2,10,11 * ----	1,2,4,6	
A	US-A-2 733 715 (FOLK) * column 2, line 28 - line 46; figure 1 * ----	2,4	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-2 954 770 (ROTH) * column 2, line 23 - line 47; figures * -----	1,2	A61F A41B
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 21 JANUARY 1993	Examiner KANAL P.
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons A: member of the same patent family, corresponding document			

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